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| Nazwa zajęć/ <i>Course title:</i> | Nanotechnology and neurobiology | ECTS | 2 |
| Nazwa zajęć w j. angielskim/ <i>Course title in English:</i> | Nanotechnologia i neurobiologia | | |
| Zajęcia dla kierunku studiów/ <i>Degree program name:</i> | Biotechnology | | |

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|----------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Język kursu/ <i>Course language:</i> English | | Poziom studiów/ <i>Study level:</i> 1 | |
| Typ studiów/ <i>Form of studies:</i> | <input checked="" type="checkbox"/> intramural <input type="checkbox"/> extramural | Status zajęć/ <i>Course status</i> | <input type="checkbox"/> podstawowe/ <i>basic</i> <input checked="" type="checkbox"/> kierunkowe/ <i>major</i> <input type="checkbox"/> obowiązkowe/ <i>mandatory</i> <input checked="" type="checkbox"/> do wyboru/ <i>elective</i> |
| | | Semestr/ <i>Semester:</i> 6 | <input type="checkbox"/> semestr zimowy/ <i>winter semester</i> <input checked="" type="checkbox"/> semestr letni/ <i>summer semester</i> |
| Rok akademicki/ <i>Academic year:</i> | | 2022/2023 | Numer katalogowy/ <i>Catalogue number:</i> BBT_BTa-1S-6L-47_2 |

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| Koordynator zajęć/ <i>Course coordinator:</i> | dr hab. Michał M. Godlewski, prof. SGGW | | | |
| Prowadzący zajęcia/ <i>Teachers responsible for the course:</i> | Employees of the Department of Physiological Sciences, Institute of Veterinary Medicine , WULS-SGGW | | | |
| Założenia, cele i opis zajęć/ <i>Aims, objectives and description of the course:</i> | <p>Neurobiology – monographic lectures on following topics: nerve cells; Blood-brain barrier; Neuron and neuronal theory; Signal conduction and modulation; Degeneration, regeneration, neuronal growth, Cannon-Rosenbluth law; Development of nerve system; Development of brain; Migration of nerve cells; Synaptogenesis; Neuronal plasticity; Neurotrophic factors; Sex dimorphism of brain; Central and peripheral nerve system; Somatic nerve system; Autonomic nerve system; Limbic system; Instinct and control of behaviour; Pain; Sensory integration.</p> <p>Nanotechnology – student seminars on selected topics about use and potential of nanotechnology in biotechnology and medicine: Nanoscale; Surface effect vs. volume effect; nanoparticles; Nanointerface; Nanodetectors; Nanomaterials in the industry; Nanomaterials in the medicine; Nanomaterials in food production; Nanomaterials interactions with living organism; Nanotoxicity.</p> | | | |
| Formy dydaktyczne, liczba godzin/ <i>Teaching forms, number of hours:</i> | a) lecture; number of hours 15 (neurobiology); b) auditorium classes; number of hours 15 (nanotechnology); | | | |
| Metody dydaktyczne/ <i>Teaching methods:</i> | Multimedia monographic lectures. Student seminars prepared individually or in groups, based on current scientific literature. | | | |
| Wymagania formalne i założenia wstępne/ <i>Formal requirements and prerequisites</i> | Passed Animal physiology. Scientific curiosity, critical thinking, analytical skills. | | | |
| Efekty uczenia się/ <i>Learning outcomes:</i> | treść efektu przypisanego do zajęć/ <i>the content of the effect assigned to the course:</i> | | Odniesienie do efektu kierunkowego <i>/Relation to the course outcomes</i> | Siła dla ef. kier* <i>/Impact on the course outcomes*</i> |
| Wiedza (absolwent zna i rozumie) <i>/Knowledge:</i> (the graduate knows and understands) | W1 | Student knows basic terms and theories regarding neurophysiology and nerve cells. Student understands interplay between elements of nerve system in the living organism. | K_W06 K_W09 K_W10 K_W03 K_W05 K_W07 K_W10 | 1 1 1 3 3 3 3 |
| | W2 | Student knows basic terms and theories regarding nanotechnology. Student understands basic uses of nanotechnology in biotechnology and medicine. | K_W09 K_W10 K_W03 K_W05 K_W07 K_W10 | 1 1 3 3 3 3 |
| Umiejętności (absolwent potrafi) <i>/Skills:</i> (the graduate is able to) | U1 | Student knows how to critically review available scientific knowledge. Student knows how to draw his own opinion and conclusions from researched topic. | K_U 17 K_U 21 K_U 22 | 3 3 3 |
| | U2 | Student knows how to present and discuss researched topic on the group forum. | K_U 17 K_U 18 K_U 21 K_U 22 | 3 3 3 3 |
| Kompetencje (absolwent jest gotów do) <i>/Competences:</i> (The graduate is ready to) | K1 | Individual and group work, communication | K_K 02 K_K 06 | 1 3 |
| | K2 | Strategy regarding storage, actualisation and enhancement of biotechnological knowledge | K_K 02 K_K 01 | 1 3 |
| | K3 | Competency in presentation of the thesis and defence of arguments | K_K 02 K_K 06 | 1 3 |

| <p><i>Treści programowe zapewniające uzyskanie efektów uczenia się:</i></p> <p><i>/Program contents ensuring the achievement of the learning outcomes:</i></p> | <p>Current knowledge regarding nerve system. Basic definitions and laws regarding nanotechnology. Application of nanotechnology in biotechnology and medicine.</p> | | | | | | | | | | | | | | |
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| <p>Sposób weryfikacji efektów uczenia się/ <i>Methods of the verification of the learning outcomes:</i></p> | <p>Neurobiology: written exam with 5 open questions, maximum 25 points. Nanotechnology: points for seminars (10 for merit, 5 for presentation skills). Points for discussion. Methods of distant learning may be used in unprecedented circumstances.</p> | | | | | | | | | | | | | | |
| <p>Szczegóły dotyczące sposobów weryfikacji i form dokumentacji osiągniętych efektów uczenia się <i>/Details on the verification methods and of the ways of documenting the learning outcomes:</i></p> | <p>Signed exam papers. Protocols with points from seminars and discussion.</p> | | | | | | | | | | | | | | |
| <p>Elementy i wagi mające wpływ na ocenę końcową/ <i>Elements and weights influencing the final grade:</i></p> | <p>Student must accumulate at least 13 points from exam and present seminar. For positive verification, at least of 21 points must be accumulated from both.</p> <table border="1"> <thead> <tr> <th>Points</th> <th>Grade</th> </tr> </thead> <tbody> <tr> <td>0-20</td> <td>failed</td> </tr> <tr> <td>20.5-23.5</td> <td>sufficient</td> </tr> <tr> <td>24-27</td> <td>sufficient plus</td> </tr> <tr> <td>27.5-30.5</td> <td>good</td> </tr> <tr> <td>31-34</td> <td>very good</td> </tr> <tr> <td>34.5-40</td> <td>excellent</td> </tr> </tbody> </table> <p>Methods of distant evaluation may be used in unprecedented circumstances.</p> | Points | Grade | 0-20 | failed | 20.5-23.5 | sufficient | 24-27 | sufficient plus | 27.5-30.5 | good | 31-34 | very good | 34.5-40 | excellent |
| Points | Grade | | | | | | | | | | | | | | |
| 0-20 | failed | | | | | | | | | | | | | | |
| 20.5-23.5 | sufficient | | | | | | | | | | | | | | |
| 24-27 | sufficient plus | | | | | | | | | | | | | | |
| 27.5-30.5 | good | | | | | | | | | | | | | | |
| 31-34 | very good | | | | | | | | | | | | | | |
| 34.5-40 | excellent | | | | | | | | | | | | | | |
| <p>Miejsce realizacji zajęć/ <i>Teaching place:</i></p> | <p>Lecture halls and classrooms of the Faculty of Veterinary Medicine</p> | | | | | | | | | | | | | | |
| <p>Literatura/Literature:</p> <ol style="list-style-type: none"> 1. JG Cunningham BG Klein Saunders, ELSEVIER, 2007, Textbook of Veterinary Physiology. 2. WF Boron, EL Boulpaep. Medical Physiology Updated Ed.: With STUDENT CONSULT Online Access; Saunders, 2004, 3. K. Schmidt-Nielsen. Animal physiology. Adaptation and environment. V ed. Cambridge University Press 1997 4. E.M. Goldys. Fluorescence applications in biotechnology and the life sciences. Wiley-Blackwell 2009 5. R. Jelinek. "Biomimetics, a molecular perspective". De Gruyter, 2013. 7. A. Mendez-Vilas. "Current Microscopy Contributions to Advances in Science and Technology, Microscopy Book Series #5". Formatex, Spain, 2012. 8. A. Mendez-Vilas. "Microscopy and imaging science: practical approaches to applied research and education, Microscopy Book Series #7". Formatex, Spain, 2017. 9. www.pubmed.gov | | | | | | | | | | | | | | | |
| <p>UWAGI/ANNOTATIONS</p> | | | | | | | | | | | | | | | |

*) 3 – zaawansowany i szczegółowy, 2 – znaczący, 1 – podstawowy/ 3 – *significant and detailed*, 2 – *considerable*, 1 – *basic*,

Wskaźniki ilościowe charakteryzujące moduł/przedmiot/*Quantitative summary of the course:*

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| <p>Szacunkowa sumaryczna liczba godzin pracy studenta (kontaktowych i pracy własnej) niezbędna dla osiągnięcia zakładanych dla zajęć efektów uczenia się - na tej podstawie należy wypełnić pole ECTS /<i>Estimated number of work hours per student (contact and self-study) essential to achieve the presumed learning outcomes - basis for the calculation of ECTS credits:</i></p> | <p>50 h</p> |
| <p>Łączna liczba punktów ECTS, którą student uzyskuje na zajęciach wymagających bezpośredniego udziału nauczycieli akademickich lub innych osób prowadzących zajęcia/ <i>Total number of ECTS credits accumulated by the student during contact learning:</i></p> | <p>1.2 ECTS</p> |